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EXAMINER
MILLER, ROSE MARY

ART UNIT	PAPER NUMBER
2856	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/683,743	Applicant(s) DEVENEY ET AL.	
	Examiner Rose M Miller	Art Unit 2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 May 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 February 2002* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Drawings

1. The drawings are objected to because empty diagram boxes are impermissible under 37 CFR §1.83(a) which recites as follows:

> *"The drawing in a nonprovisional application must show every feature of the invention specified in the claims. However, conventional features disclosed in the description and claims, where their detailed illustration is not essential for a proper understanding of the invention, should be illustrated in the drawing in the form of a graphical drawing symbol or a* ***labeled*** *representation (e.g., a* ***labeled*** *rectangular box)." (Emphasis added by Examiner)*

The empty diagram boxes 12, 14, 16 and 18, found in Figure 1 of the drawings, must be labeled with an appropriate descriptive phrase in addition to the reference legend all ready present. Appropriate correction is required.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The abstract of the disclosure is objected to because legal phraseology is not allowed in the abstract. Therefore the phrase "comprises" should be replace with a more appropriate phrase. Correction is required. See MPEP § 608.01(b).

Claim Objections

3. Claims 1-20 are objected to because of the following informalities: Claims 1-20 are replete with inconsistencies. An example is found in the body of claim 1. Claim 1 recites receiving "reflections", plural, but only using a single "amplitude" of the received reflections. Is there an amplitude from a particular reflection that is used? An amplitude average? Applicant consistently switches between the use of plurals and the use of singular amplitudes and/or reflections throughout the claims. This is confusing and makes it difficult to understand exactly what is being claimed. A suggestion for correction is to carefully rewrite the claims using either the singular form or the plural

form of the desired elements but not both unless it is properly explained. Appropriate correction is required.

4. Claim 15 is objected to because of the following informalities: The phrase "a linear lest squares fit", found on lines 1-2 of claim 15, is clearly a typographical error. Appropriate correction is required. For the purposes of applying prior art, claim 15 has been treated as if the phrase was the correct phrase --a linear least squares fit--.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claim 19 is rejected under 35 U.S.C. 102(b) as being clearly anticipated by **Hayford et al. ("The correlation of ultrasonic attenuation and shear strength in graphite-polymide composites")**.

Hayford et al. clearly discloses means for non-destructively testing a first part (see pages 439 - 443) and means for predicting a residual strength (see page 431, 1st paragraph) of the first part using a result from a non-destructive test of the first part wit a plurality of destructive and non-destructive tests on second parts substantially similar to the first part (see pages 439-443).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Hayford et al.**

Hayford et al. discloses the claimed invention with the exception of the first and second parts comprising aircraft parts. It would have been obvious to one of ordinary skill in the art at the time the invention was made to test aircraft parts on the system disclosed by **Hayford et al.** as **Hayford et al.** teaches testing a composite. The majority of aircraft parts are made from composite parts. Therefore, the invention of **Hayford et al.** would work equally well on aircraft parts as on the disclosed components.

10. Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hayford et al.** in view of **Ansberg (SU 1322138 A)**.

Hayford et al. discloses providing a composite first part (see page 431, 1st paragraph); introducing ultrasound to the first part (page 431, 1st paragraph), receiving reflections of the ultrasound introduced to the first part (page 431, 1st paragraph) and predicting a residual strength (page 431, 1st paragraph) using an attenuation of the received reflections. **Hayford et al.** also discloses correlating the attenuation of at least one received reflection of at least one second part with at least one non-ultrasound test of the second part and specifically wherein the non-ultrasound test is a destructive test of the second part (see pages 438-443). **Hayford et al.** also discloses correlating the attenuation of at least one received reflection of a plurality of second parts with at least

one non-ultrasound test of each of the second parts and specifically wherein the non-ultrasound test is a destructive test of the second part (see pages 438-443).

With regards to claims 1-3, 5, and 10, **Hayford et al.** discloses the claimed invention with the exception of using an amplitude of the received reflections to predict the residual strength of the composite. **Ansberg** teaches that it is known to correlate the amplitude of the received reflections to the strength of the article under test. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of **Hayford et al.** to correlate the amplitude of the received reflection to the strength of the material under test as it is well known throughout the art that in order to measure an attenuation, one must first measure the amplitude of the reflected wave and **Ansberg** clearly teaches that using just the amplitude would reduce the amount of computations necessary to determine the strength of the material under test.

With regards to claim 4, **Hayford et al.** discloses the claimed invention with the exception of the destructive test of the second part comprising a core sample test. **Hayford et al.** discloses using a "standard short beam shear test" as the destructive test which is correlated with the ultrasound attenuation measured. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to correlate the amplitude of the reflections with the results of a core sample test as the performance of a core sample test is a standard destructive test used to determine a problem with sample or part and **Hayford et al.** teaches correlating a known standard destructive test with a non-destructive ultrasound test.

With regards to claim 6, **Hayford et al.** discloses the claimed invention with the exception of the correlation of the amplitude comprises generating a linear least squares fit between the amplitudes and a plurality of results from the non-ultrasound tests. **Hayford et al.** discloses on page 439, 3rd paragraph, using a "reasonable straight line fit" to the data and on page 442 using "a linear regression analysis of the data". Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made utilize a least squares fit between the measured attenuations (or

amplitudes) and a plurality of results from the non-ultrasound (or destructive) tests as the least squares fit is a well known "linear regression analysis" used throughout the art.

With regards to claims 7-8, **Hayford et al.** fails to specifically disclose the residual strength predicted being a residual shear strength. **Hayford et al.** discloses on page 439, 1st paragraph, using the "nondestructive pulse-echo method" to yield "a quantitative estimate of the short beam shear strength". Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the "residual strength" being measured or predicted would be a residual shear strength as the shear strength is the strength being measured.

With regards to claim 9, **Hayford et al.** discloses the claimed invention with the exception of the correlation of the amplitude comprises generating a linear least squares fit between the amplitudes and a plurality of results from the non-ultrasound tests. **Hayford et al.** discloses on page 439, 3rd paragraph, using a "reasonable straight line fit" to the data and on page 442 using "a linear regression analysis of the data". Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made utilize a least squares fit between the measured attenuations (or amplitudes) and a plurality of results from the non-ultrasound (or destructive) tests as the least squares fit is a well known "linear regression analysis" used throughout the art.

With regards to claims 11-12 and 14, **Hayford et al.** discloses the claimed invention with the exception of a memory containing a correlation of an amplitude of at least one received reflection of at least one second part (or a plurality of parts) with at least one non-ultrasound test, or destructive test, of the (or each) second part, said processor further configured to predict a residual strength of the first part using an amplitude of a received ultrasound reflection and the correlation. **Hayford et al.** discloses correlating the attenuation of at least one received reflection of at least one second part with at least one non-ultrasound test of the second part and specifically wherein the non-ultrasound test is a destructive test of the second part (see pages 438-443). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of **Hayford et al.** to include the above measured correlation in a memory such that a residual strength of a first part could be

predicted using the received reflections and the correlation as **Ansberg** clearly teaches storing a correlation in a memory for the sole purpose of determining the strength of a material by correlating an amplitude of a received reflection with a stored correlation dependency.

With regards to claim 13, **Hayford et al.** discloses the claimed invention with the exception of memory containing a correlation of an amplitude of at least one received reflection of at least one second part with a core sample test. **Hayford et al.** discloses using a "standard short beam shear test" as the destructive test which is correlated with the ultrasound attenuation measured. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to correlate the amplitude of the reflections with the results of a core sample test by utilizing a correlation base on such stored in a memory as the performance of a core sample test is a standard destructive test used to determine a problem with sample or part and **Hayford et al.** teaches correlating a known standard destructive test with a non-destructive ultrasound test and **Ansberg** clearly teaches storing a correlation in a memory for the sole purpose of determining the strength of a material by correlating an amplitude of a received reflection with a stored correlation dependency.

With regards to claim 15, **Hayford et al.** discloses the claimed invention with the exception of the correlation of the amplitude comprises generating a linear least squares fit between the amplitudes and a plurality of results from the non-ultrasound tests. **Hayford et al.** discloses on page 439, 3rd paragraph, using a "reasonable straight line fit" to the data and on page 442 using "a linear regression analysis of the data". Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made utilize a least squares fit between the measured attenuations (or amplitudes) and a plurality of results from the non-ultrasound (or destructive) tests as the least squares fit is a well known "linear regression analysis" used throughout the art.

With regards to claims 16-17, **Hayford et al.** fails to specifically disclose the residual strength predicted being a residual shear strength. **Hayford et al.** discloses on page 439, 1st paragraph, using the "nondestructive pulse-echo method" to yield "a quantitative estimate of the short beam shear strength". Therefore, it would have been

obvious to one of ordinary skill in the art at the time the invention was made that the "residual strength" being measured or predicted would be a residual shear strength as the shear strength is the strength being measured.

With regards to claim 18, **Hayford et al.** discloses the claimed invention with the exception of the correlation of the amplitude comprises generating a linear least squares fit between the amplitudes and a plurality of results from the non-ultrasound tests. **Hayford et al.** discloses on page 439, 3rd paragraph, using a "reasonable straight line fit" to the data and on page 442 using "a linear regression analysis of the data". Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made utilize a least squares fit between the measured attenuations (or amplitudes) and a plurality of results from the non-ultrasound (or destructive) tests as the least squares fit is a well known "linear regression analysis" used throughout the art.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Bar-Cohen et al. (US 4,457,174) disclose an ultrasonic inspection of composite materials.

Salvado (US 4,74,545) discloses a nondestructive measurement of fractions of phases in mixtures and composite materials.

Salvado et al. (US 4,961,346) discloses an apparatus for performing ultrasonic measurements.

Mackay et al. (US 5,170,367) discloses a nondestructive determination of phase fractions of composite materials.

Hildebrand (US 5,335,184) discloses nondestructive ultrasonic testing of materials.

Fink (US 5,431,053) discloses an ultrasonic imaging method and apparatus.

Hirsekorn et al. (US 6,164,136) discloses a device for the investigation of boundary layer areas using ultrasound.

Zeroug et al. (US 2002/0112540 A1) discloses an acoustic method for estimating mechanical properties of a material.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rose M Miller whose telephone number is 703-305-4923. The examiner can normally be reached on Monday - Friday, 7:30 am to 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 703-305-4705. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7382 for regular communications and 703-308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

RMM
June 27, 2003

HELEN KWOK
PRIMARY EXAMINER